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SOURCES OF INFORMATION FOR RESPONSES TO READING TEST ITEMS.

BY- WEAVER, WENDELL W. BICKLEY, A. C.

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SOURCES OF INFORMATION FOR RESPONSES TO MULTIPLE-CHOICE ITEMS ON READING COMPREHENSION TESTS AND THE EFFECTS OF CONTENT WORDS AND FUNCTION WORDS IN SUPPLYING INFORMATION FOR THE CORRECT COMPLETION OF MULTIPLE-CHOICE ITEMS WERE STUDIED IN AN EXPERIMENT AT CAMPBELL COLLEGE. PARAGRAPHS WITH ACCOMPANYING MULTIPLE-CHOICE ITEMS SAMPLED FROM READING TESTS LISTED IN BUROS SIXTH YEARBOOK WERE SELECTED AS THE TEST PASSAGES. SUBJECTS WERE 147 SOPHOMORES ENROLLED IN INTRODUCTORY PSYCHOLOGY COURSES AND WERE RANDOMLY ASSIGNED TO SEVEN TREATMENTS INVOLVING THE BLACKING OUT OF (1) ALL OF THE READING PASSAGE, (2) ALL NOUNS, VERBS, AND ADJECTIVES, (3) ALL FUNCTION WORDS, (4) NONE OF THE READING PARAGRAPH, (5) 10 PERCENT OF THE NOUNS, VERBS, AND ADJECTIVES, (6) 50 PERCENT OF THE NOUNS, VERBS, AND ADJECTIVES, AND (7) 90 PERCENT OF THE NOUNS, VERBS, AND ADJECTIVES. A TREND ANALYSIS OF THE EFFECT OF BLACKING-OUT INCREASING PERCENTAGES OF NOUNS, VERBS, AND ADJECTIVES AND COMPARISONS BETWEEN TREATMENTS 1 AND 3 AND BETWEEN TREATMENTS 3 AND 4 WERE MADE. IN THE DISCUSSION OF RESULTS, IT WAS CONCLUDED THAT READING COMPREHENSION TESTS WERE HIGHLY DEPENDENT ON EXAMINEE CHARACTERISTICS WHICH OFTEN HAD LITTLE TO DO WITH THE READING TASK BEING EXAMINED. APPARENT REASONS FOR THIS ARE PROPOSED AND ANALYZED. TABLES AND REFERENCES ARE INCLUDED. THIS SPEECH APPEARS IN THE 1967 PROCEEDINGS OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION, DIVISION 15. (LS)

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Abstract

Sources of information for responses to reading test items

Wendell W. Weaver

The University of Georgia

and A. C. Bickley

Campbell College

The study dicotomizes the source of information in responding to multiple-choice items on reading comprehension tests into "learnings brought to the test situation" by the examinee and "information derived from the reading display itself." The effects of content words and function words in supplying information for the correct completion of multiple-choice items is also examined.

By using a modification of a black-out technique it was found that some reading test items can be answered as well without reading a supposedly relevant paragraph as when the paragraph is read. Apparent reasons for this effect are proposed and analyzed.

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Sources of Information for Responses to Reading Test Items

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It is not uncommon to find in the reading literature the question, "What do reading tests really measure?" (Kingston, 1965). A cursory look at the task imposed by a reading comprehension test indicates that the person taking the test is to read the paragraph and then answer the multiple-choice questions which follow. The assumption is that the antecedent behavior of reading the paragraph is necessary (even if not sufficient) for answering the test items correctly. That a prior perusal of a graphic display is a requirement for reading to have occurred is indicated by the definition of reading in English and English (1958, p.442). Reading is defined as, "the perception of written, printed, or engraved symbols constituting a communication....." One of the purposes of this study is to attempt to clarify empirically the source of semantic information as measured by reading comprehension tests.

Language has been divided into two categories by numerous linguists. Hockett (1963) has pointed out that a characteristic of language which has been called a universal of language is the dicotomy between grammatical and non-grammatical meaning. Non-grammatical meaning is synonymous with the term "conceptual information." Rankin (1957) has shown that conceptual information is dependent upon the nouns and verbs in the reading passage more than is grammatical meaning and that grammatical meaning is more

closely connected with function words than it is with nouns and verbs (often called "lexical" words). Another purpose of this study is to examine the relationship between grammatical and non-grammatical features of language with regard to their effects upon conceptual information as measured by the multiple-choice items on reading comprehension tests.

Method

The black-out technique was developed by Holland and Kemp (1965) for the study of programmed instruction. They were attempting to determine which frames were, and which frames were not, giving information which allowed the response frame to be completed correctly. It was found that many frames had cues to the correct answer that were unrelated to the topic which the programmers intended to teach. These experimenters chose words to blackout that they judged to contain crucial information for answering the questions asked about the material.

It was hoped that this technique could be used to analyze reading comprehension tests. However, it soon became apparent that many reading test items were not dependent on specific locations or specific words in the reading display. Therefore, in this study percentages of content words were blacked out.

The materials were paragraphs sampled from reading tests listed in Buros' (1965) sixth yearbook. The paragraphs taken from the different tests were selected arbitrarily with length and number of questions pertaining to the paragraphs the only constraining criteria.

The Ss were 147 sophomores, randomly selected from 240 sophomores enrolled in courses in introductory psychology at Campbell College and

randomly assigned to seven treatments, as follows:

1. All of the reading passage blacked out
2. All nouns, verbs, and adjectives blacked out
3. All function words blacked out
4. None of the reading paragraph blacked out
5. 10% of the nouns, verbs, and adjectives blacked out
6. 50% of the nouns, verbs, and adjectives blacked out
7. 90% of the nouns, verbs, and adjectives blacked out

The questions pertaining to the reading passages were not altered in any way and the subjects were instructed to answer all the questions from whatever information was available to them in their particular reading passages.

Results

Two types of orthogonal comparisons were planned (See Table 1). One set of comparisons was whether a significant difference was present between the means of treatments one and three and between treatments three and four. For the former comparison, a non-significant difference would indicate that function words add nothing to conceptual meaning; for the latter, a difference would indicate the function words, on their own, add conceptual meaning.

The other set of comparisons was a trend analysis of the effect of blacking-out increasing percentages of nouns, verbs, and adjectives. It

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Insert Table 1 about here

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was assumed that a deletion of 10%, 50% and 90% of lexical items, while

leaving the function words intact, would be related linearly to the number of multiple-choice items answered correctly.

Orthogonal planned comparisons of means and a trend analysis were computed. There was a significant difference in the number of correct

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Insert Table 2 about here

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answers to multiple-choice items on a passage when the paragraph on which the items (supposedly) depended was intact, as opposed to correct answers to the same items when function words were blacked out and only lexical words remained. There was no significant difference in multiple-choice item responses when function words alone were compared to a complete deletion of the paragraph from which the items were drawn (See Table 2).

There is a significant linear trend with a nonsignificant quadratic component. While not statistically appropriate in this analysis, adding the 100% deletion treatment and the 0% treatment to the series increases the F-ratio.

Discussion

The relationship of function words and lexical words to the completion of multiple-choice items on reading tests is a complex one. For this population, function words alone, supplied no conceptual information. Lexical words alone, supplied twice as much information as no paragraph at all (when the guessing score was subtracted). Function words in combination with lexical words (the normal language situation) have a large

effect on the completion of the multiple-choice items, but by no means the unique effect ordinarily assumed by users of reading test.

The effect of removing increasing proportions of lexical words with the rest of the context intact is linear (See Table 2). This implies that the conceptual information needed to reduce uncertainty about reading test items is scattered widely throughout a passage. A reduction of nouns, verbs, and adjectives reduces available conceptual information proportionally.

The general impression of the results is that there are at least two relatively distinct sources of information for the completion of multiple-choice items in reading comprehension tests. One source is the conceptual information the subject brings to the testing situation about the topics which the test samples. The previously learned information apparently allows the subjects to correctly respond to test items on the basis of greatly reduced cues in the reading passages, or in the absence of a reading passage, on the basis of cues in the test items alone. Ss who had no reading passage to aid in answering the item, nevertheless, correctly completed 67% as many items as Ss with all the reading passage. Perhaps this was accomplished in one or more of the following ways:

1. Ss knew the correct answer from past learning
2. Ss eliminated distractors which were not likely in any reading situation
3. Ss used information from preceding items to reduce uncertainty about succeeding items.

It was possible, using the data gathered in this study, to make an informed guess as to whether or not the Ss used information from preceding items to reduce uncertainty about items which followed. There were five sets of three sequential items each, e.g. 21, 22, 23, for which there were high proportions of correct responses under the complete blackout treatment. Other than these five sets, only two single items had over 50% correct responses under the complete blackout treatment.

A modification of Guttman's scaling technique was used to analyze the responses. In all but one of the five sets proportionality was greater than .90--in that case it was .82. While nothing more than a highly suggestive relationship should be inferred from these "rough-and-ready" operations, indications are that a potential major source of cues to conceptual information on a paragraph reading test is the information derived from preceding items concerning a particular topic.

The results of this study indicate that reading comprehension tests are highly dependent on examinee characterictics which often have little to do with the reading task the examiner assumes he is presenting. Reading tests are measuring past learning, word association, irrelevance of distractors, and "item conceptual-information constraints," as well as the person's ability to answer multiple-choice items directly from cues in the reading display. The sources of variation are so confounded that two, or more, factors could be hidden here, and one would never know. Much of the confounding could be reduced by changes in methods of selecting items.

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Table 1

Weights of Planned Comparisons

Comparisons	Treatments						
	1	2	3	4	5	6	7
1	1	0	-1	0	0	0	0
2	0	1	0	-1	0	0	0
3	0	0	0	0	-1	0	1
4	0	0	0	0	1	-2	1

Table 2

Significance Levels of Orthogonal Comparisons

Variation source	Mean difference	Degrees freedom	t	Mean square	F
Comparison 1	3.95[b]	126	4.76[a]		
Comparison 2	1.24[b]	126	1.49		
Comparison 3		1		247.	15.[a]
Deviations		1		7.	
Within Grps		60		15.	

[a]Significant at .05 level.

[b]Standard error .83.